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**Wright State University**
Department of Management
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STUDIES OF SCHEDULING AND RESOURCE ALLOCATION TECHNIQUES
FOR REPARABLE ITEM INVENTORY SYSTEMS

March 20, 1980

Dr. I. N. Shimi
Air Force Office of Scientific Research
AFOSR/NM
Building 410
Bolling AFB, D. C. 20332

Subject:  Final Scientific Report for
          AFOSR Grant 76-3011

Dear Dr. Shimi:

This communication marks the completion of our research efforts
for "Studies of Scheduling and Resource Allocation Techniques
for Reparable Item Inventory Systems" funded by AFOSR Grant 76-3011.
Since beginning these efforts, we have conducted a number of in-
vestigations to develop and evaluate improved procedures for the
planning and control of Air Force reparable item inventories.
These studies have ranged from the development and testing of
large-scale optimization techniques for depot repair planning
to the development and evaluation of multi-location inventory
system distribution rules.  The complete results of our efforts
are documented in a series of thirty-two Working Papers.  In
several cases, these results were also presented at national
meetings of technical societies or published in appropriate
journals.  A list of the working papers and publications funded
by this grant is attached.

I have hand-carried copies of all of these papers to the Management
Science Office (AFLC/XRS) at Headquarters, Air Force Logistics
Command, and I have previously sent you copies of several of the
papers which appear to be of general Air Force interest.  In
addition, I plan to send you copies of working papers completed
since January, 1979 as soon as I get the copies back from Printing
Services.  If you would like copies of any other reports, please
let me know.

We at Wright State sincerely appreciate the opportunity to work
with AFOSR in the development and evaluation of improved logistics
management techniques, and we hope to work with you again in the
near future.  I personally am very grateful for the advice and
assistance that you have provided me in the past few years, and
I hope we will meet again soon.

Sincerely yours,

W. Steven Demmy
Associate Professor
Department of Management

QUALITY INSPECTED 4

Demmy, W. Steven, and Andrew W. Lai, Multi-Item Scheduling with
Reflection Programming, Working Paper 76-3011-1, Department of
Administrative Sciences and Finance, Wright State University,
Dayton, Ohio 45435, 5 pp. Published in Conference Proceedings:
The Problems of Disaggregation in Manufacturing and Service
Organizations, The Ohio State University, Columbus, Ohio, March
1977. This paper was also published in the book Disaggregation;
Problems in Manufacturing and Service Organizations, Martin
Nijhoff Publishing Company, Boston, 1979, pp. 185-195.

Demmy, W. Steven and James L. Minch, A FORTRAN Code for Fulkerson's
Out-of-Kilter Algorithm, Working Paper 76-3011-2, Department of
Administrative Sciences and Finance, Wright State University,
Dayton, Ohio 45435, February 1977, 16 pp.

Demmy, W. Steven, Algorithms for Computing Repair Schedules in Probabil-
istic Environments, Working Paper 76-3011-3, Department of Adminis-
trative Sciences and Finance, Wright State University, Dayton, Ohio
45435, April 1977, 26 pp.

Demmy, W. Steven, Multi-Item Scheduling in Reparable Item Inventory
Systems with Reflection Programming, Working Paper 76-3011-4
Department of Administrative Sciences and Finance, Wright State
University, Dayton, Ohio 45435, April 1977, 33 pp. Presented at
the Joint National Meeting of Operations Research Society of
America and The Institute of Management Science, San Francisco, Ca.,
May 1977, 33 pp.

Demmy, W. Steven, GGUB: A FORTRAN Code for Generalized Upper Bounding
(GUB) Linear Programming Problems, Working Paper 76-3011-5, Depart-
ment of Administrative Sciences and Finance, Wright State University,
Dayton, Ohio 45435, May 1977, 33 pp.

Demmy, W. Steven, EWAGNR: A FORTRAN Code for the Support Level Algorithm,
Working Paper 76-3011-6, Department of Administrative Sciences and
Finance, Wright State University, Dayton, Ohio 45435, 39 pp.

Demmy, W. Steven, Studies of Scheduling and Resource Allocation Techniques
for Reparable Item Inventory Systems: A Progress Report and a Proposal
for Additional Research, Working Paper 76-3011-7, Department of Admin-
istrative Sciences and Finance, Wright State University, Dayton, Ohio
45435, March 1977, 18 pp.

Demmy, W. Steven, Multi-Item Scheduling in Inventory/Repair Systems with
Reflection Programming: An Overview, Working Paper 76-3011-9, Depart-
ment of Administrative Sciences and Finance, Wright State University,
Dayton, Ohio 45435, October 1977. Published in Proceedings of the 1977
Chicago Meeting of the American Institute for Decision Sciences,
October 1977, p. 598.

Demmy, W. Steven, Transients in M/G/∞ Models of Recoverable Item
    Inventory Systems, Working Paper 76-3011-10, Department of
    Administrative Sciences and Finance, Wright State University,
    January 1978, 22 pp. Presented at Nineth Annual Conference on
    Modeling and Simulation, University of Pittsburgh, Pittsburgh,
    Pa., April 1978, 5 pp. This paper was also published in Modeling
    and Simulation, Vol. 9, Part IV, Instrument Society of America,
    400 Stanwix Street, Pittsburgh, Pa., 15222, April 1978, pp 1279-
    1284.

Demmy, W. Steven, A Limiting Form of the Negative Binomial Probability
    Distribution, Working Paper 76-3011-11, Department of Adminis-
    trative Sciences and Finance, Wright State University, January 1978,
    5 pp.

Demmy, W. Steven, Some Tables and Curves of Negative Binomial Probabilities
    and Depot Delay Factors for AFLC Recoverable Items, Working Paper 76-
    3011-12, Department of Administrative Sciences and Finance, Wright
    State University, January 1978, 55 pp.

Demmy, W. Steven, A Tchebycheff Inequality for Optimum Reorder Levels in
    Stationary EOQ Inventory Systems, Working Paper 76-3011-13, Department
    of Administrative Sciences and Finance, Wright State University, January
    1978, 12 pp.

Demmy, W. Steven, A General Procedure for Depot Repair Planning, Working
    Paper 76-3011-14, Department of Administrative Sciences and Finance,
    Wright State University, January 1978, 32 pp.

Demmy, W. Steven, On the METRIC Distribution Algorithm, Working Paper
    76-3011-16, Department of Administrative Sciences and Finance, Wright
    State University, May 1978, 9 pp. Published in Modeling and Simulation,
    Vol. 10, 1979. W. G. Vogt and M. H. Mickle (editors), Instrument So-
    ciety of America, 400 Stanwix Street, Pittsburgh, Pa.

Demmy, W. Steven, RSIM -- The Repair System Simulator, Working Paper
    76-3011-17, Department of Administrative Sciences and Finance, Wright
    State University, April 1978, 32 pp.

Demmy, W. Steven, Studies of Scheduling and Resource Allocation Techniques
    in Reparable Item Inventory Systems: A Progress Report and a Proposal
    for Additional Research, Working Paper 76-3011-18, Department of
    Administrative Sciences and Finance, Wright State University, February,
    1978, 27 pp.

Demmy, W. Steven and R. M. Genet, On the Benefit-to-Cost Ratio of Base-Level
    Stocking Decisions for Low Demand Items, Working Paper 76-3011-19,
    Department of Administrative Sciences and Finance, Wright State Uni-
    versity, April 1978, 20 pp.

Demmy, W. Steven, Russel M. Genet, Thomas D. Meitzler, and Capt. R. E.
    Miles, Optimizing Tomorrow's Spares Procurement Through Increasing
    Availability of Today's Aircraft, Working Paper 76-3011-20, Dept. of
    Administrative Science and Finance, Wright State University, Dayton,
    Ohio 45432, June 1978, 5 pp. Published in Proceedings of the Seventh
    Annual DOD Symposium on Acquisition Research, Hersey, Pa. April 1978.

Genet, R. M., W. S. Demmy, T. D. Meitzler, T. R. Edison, and D. J. Coleman, Identifying and Evaluating R & M Investments for Fielded Military Equipment, Working Paper 76-3011-21, Dept. of Administrative Sciences and Finance, Wright State University, Dayton, Ohio 45435, January 1979, 4 pp. Published in 1979 Proceedings of the Annual Maintainability and Reliability Symposium, January 1979, pp. 243-247.

Barlow, Mark A. and W. Steven Demmy, Source Listings and Variable Definitions for METRIC: A Fortran Code for Implementing Sherbrooke's METRIC Algorithm, Working Note 78-3011-22, Dept. of Administrative Science and Finance, Wright State University, Dayton, Ohio 45435, January 1979, 18 pp.

Tamavimok, Ted W., and W. Steven Demmy, A Fortran Program for Deterministic Material Requirements Planning, Working Paper 76-3011-23, Dept. of Administrative Sciences and Finance, Wright State University, Dayton, Ohio 45435, January 1979, 27 pp.

Barlow, Mark A. and W. Steven Demmy, METSIM: A Model for Simulating Two Echelon, Multi-Item Inventory/Repair Systems, Working Paper 76-3011-24, Dept. of Administrative Sciences and Finance, Wright State University, Dayton, Ohio 45435, March 1979, 55 pp.

Demmy, W. Steven, Maj. Donald F. Pederson, and Henry Triwash, A Study of the Predictive Accuracy of Flying Hour and Sortie Models for Estimating Remove and Replace Actions for C-130E Aircraft, Working Paper 76-3011-25, Dept. of Administrative Science and Finance, Wright State University, Dayton, Ohio 45435, February 1979, 22 pp.

Barlow, Mark A. and W. Steven Demmy, Fortran Source Programs for Metsim: A Model for Simulation Two Echelon, Multi-Item Inventory/Repair Systems, Working Paper 76-3011-26, Dept. of Administrative Sciences and Finance, Wright State University, Dayton, Ohio 45435, February, 1979, 79 pp.

Demmy, W. Steven, and Victor J. Presutti, Multi-Echelon Inventory Theory in the Air Force Logistics Command, Working Paper 76-3011-27, Dept. of Administrative Sciences and Finance, Wright State University, Dayton, Ohio 45435, May, 1979, 36 pp. Presented at Conference on Multi-Level Inventory Systems, Purdue University, 24-25 May 1979 This paper will be published in the book Multi-Level Production Inventory Systems: Theory and Practices, Leroy B. Schwarz (editor), TIMS Studies in Management Sciences, 1980.

Nahmias, Steven and W. Steven Demmy, Support Levels in Inventory Management Systems, Working Note 76-3011-28, Dept. of Administrative Sciences and Finance, Wright State University, Dayton, Ohio 45432. Presented at the New Orleans Joint National Meeting of ORSA/TIMS, April 1979.

Demmy, W. Steven, An Analytical Sensitivity Analysis of the METRIC Flush-Out Phenomena, Working Paper 76-3011-29, Dept. of Administrative Sciences and Finance, Wright State University, Dayton, Ohio 45435, May, 1979, 38 pp. Published in 1980 Proceedings of Northeastern Meeting of American Institute of Decision Sciences (AIDS), Dayton, Ohio, April 1980, 4 pp.

Demmy, W. Steven, and Mark A. Barlow, CALPLOT: A Fortran Code for the IBM 1627 Plotter, Working Note 76-3011-30, Dept. of Management, Wright State University, Dayton, Ohio 45435, August 1979, 20 pp.

Demmy, W. Steven, A Simulation Study of the METRIC Flush-Out Phenomenon and a Comparison with Current Air Force Distribution Policy, Working Paper 76-3011-31, Dept. of Management, Wright State University, Dayton, Ohio 45435, Jan. 1980, 39 pp.

Nahmias, Steven, and W. Steven Demmy, Operating Characteristics of an Inventory System With Rationing, Working Paper 76-3011-32, Dept. of Management, Wright State University, Dayton, Ohio 45435, December 1979, 18 pp.